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# The CFF DC EMUs of the Swiss Romande

Neil Wheelwright



CFF EMU BDe4/II 1302 departing Genève in March 1984 as a two-car unit.

Photos: Neil Wheelwright

## Neil Wheelwright continues his survey of EMUs with an appraisal of the DC units that operated to the west of Genève

### Background

The railway line from the Swiss border at La Plaine into Genève was built by the Compagnie Lyon - Genève in 1858, as part of their main line from Lyon, after the cantonal government had authorised the concession in 1853 and provided funding of two million francs. The double-track, 14.5 km line sometimes called the 'Ligne du Mandement'

became part of the PLM (Paris Lyon Méditerranée) in January 1862 and was bought by the CFF in 1913. A branch to the freight yard at La Praille was opened in 1959.

Although the CFF is responsible for all maintenance of this section of the line, including the overhead, the signalling continues to be the French system. In September 1956 the line from Culoz to Genève was electrified at 1500V DC, the standard in this area of France. This left the CFF with the problem of how to run their local service out of Genève under an electrification system unique for the CFF. Their solution was to build two, unique, 1500V DC 'EMUs'.

In 1995, after nearly 40 years of service, the BDe4/4 II were retired and replaced with new rolling stock, the class Bem 550s. At the same time the service was branded Rhône Express Régional ('RER' but with the first 'R' reversed) and the service roughly doubled.

In July/August 2014 the (Bellegarde) La Plaine - Genève section was re-electrified at 25kV AC 50Hz, causing the withdrawal of the class 550 units.

This has led to a third generation of Swiss stock being used, albeit now selected from the CFF EMU BDe4/II 1301 La Plaine in May 1985.



standard fleet, including AC fitted Flirts (which will be covered in a later article) and the NPZ AC fitted class 562s.

From December 2019 the route will be part of the 'Le Léman Express' network, following on from the introduction of CEVA (Cornavin-Eaux-Vives-Annemasse) services.

### The BDe4/4 II Units

The CFF ordered a pair of single ended BFe4/4 II units numbered 881 and 882, plus Leichtstahl driving composite trailers 1801 and 1802 which were delivered in 1956-1957.

In 1962 these were reclassified and renumbered as BDe4/4 II 1301 and 1302 in 1960-1961. The driving trailers had their first-class section downgraded in the late 1970s becoming Bt 29-07 901 and 902.

The power cars were built by SWS Schlieren and SAAS Genève, weighed 49t and had a power rating of 1090kW giving a maximum speed of 100km/h. The driving trailers had seats for 71 plus two tip-up seats and weighed 31t.

The units usually ran as three car sets with a Leichtstahl second class coach inserted from a batch of four allocated to the service (originally B4ü 5302-5305 but renumbered B 29-30 500-503 and later to 29-37 500-502). These were selected from a specific batch built in 1939 for services into Italy. They had their Italian compatible 3000V DC heating circuit converted to 1500V DC and were fitted for multiple unit operation.

By all accounts these units were underpowered and unreliable, requiring CFF to set up an alternative arrangement to run the service when they were unavailable. The chosen solution was diesel haulage, often in what we now know as 'top and tail' mode. However, the diesels then available locally, usually Bm4/4, or even Em3/3, had no electric train supply. To provide this, a pantograph and appropriate switchgear were added to one of the four coaches (503) in 1978 and renumbered B 27-30 500 (later B 27-37 500) which was nicknamed 'Giraffe'. The equipment took up passenger space, reducing capacity from 72+2 to 56+2 seats, as well as increasing the weight to 40t. The diesel locos had a maximum speed of 65 or 75 km/h which must have increased journey times. It is reported that on occasion, multi-voltage Ee3/3 IV shunting locos would be



TOP: CFF EMU BDe4/II 1301 in bay platform at Genève as a three-car unit in May 1987. Note that the power car is now at the country end.

MIDDLE: CFF 1500V DC Leichtstahl coach 27-37 500 with pantograph stabled in Genève sidings in May 1987.

BOTTOM: CFF Bem 550002 at La Plaine being passed by SNCF electric locomotive CC6555 in May 1996.

used, with an even lower maximum speed. Also, a multi-voltage prototype locomotive, Ae4/6 III 10851, was used between 1961 and 1978, donating some of its switchgear to the Giraffe.

When not in use, the units would be stabled in the 'SNCF' sidings on the north-west side of the line towards Lausanne.

One oddity I've noticed from my photographs is that the stock, including the pantograph coach, were turned at least once, between January 1986 and May 1987, which seems unusual for a straight end-to-end route.

These units were withdrawn in 1995 although 1301 and 902 were kept in reserve for a short time to cover any teething problems with their replacements.

### The Bem 550 Units

Not least due to the increasing population served by the line, it was decided to upgrade the Genève - La Plaine service and replace the original units under the Rhône Express Regional brand.

Ideas considered for a low-cost solution included the Karlsruhe tram-trains (several of which had visited Switzerland, including one in connection with the TSOL), standard gauge versions of the low-floor units built for RBS, BD, etc., in the early 1990s, DC conversion of NPZ sets; purchase of SNCF Z2 units as used on the through service into Genève and a DC version of Zurich S-Bahn class 450 sets.

In the end, a new design was chosen based on the units ordered for the Tramway Sud-Ouest Lausanne (TSOL).

The units, Bem4/6 550000-004 (originally expected to be class 551) were ordered in 1992 as a follow-on order to the TSOL units. They were built in 1994, based on the Lausanne metro line 1 EMUs, by ACMV (Ateliers de Constructions Mécaniques de Vevey) in Villeneuve, with electrical equipment provided by ABB with input from Düwag. Five units were ordered, as it was envisaged that services would be provided by two coupled pairs plus one unit as maintenance spare, although in practice single units were often used. The units, named after areas in the region around the La Plaine line, entered service in November 1994.

To get over the problem of having to access the CFF depot at the eastern end of the station under 15kV AC catenary, a small 88kW diesel engine was fitted.

The units, which were fitted with SNCF signalling equipment, were 30m long; had 79 seats; weighed 45t and the power rating of 600kW gave a top speed of 100km/h. The interiors were very much designed for short journeys – the scheduled journey to La Plaine being only 18 minutes.



TOP: CFF Bem 550002's rather spartan interior as in May 1996.

MIDDLE: CFF Bem 550002 in the bay platform at Genève plus SNCF TGV 516 in May 1996.

BOTTOM: CFF Bem 550003 plus 550002 at the east end of Genève in June 2005 running on diesel power under Swiss AC catenary.

Whilst very similar to the 1994 built TSOL units, there were a number of differences, as the TSOL units (558201-217) ran under 750v DC, weighed 42.6t; were 31m long and had a lower maximum speed of 80km/h. The CFF units had fewer doors – three double doors per side rather than 4 doubles and 2 single-leaf doors per side, and had to deal with low level platforms resulting in their doors being deeper and with steps inside and a permanent entrance step plate below the doors.

Concerns were raised over the use of light-weight stock, particularly crash resistance and the effects of build strength on service life. However, there were calls for an AC version for use on the main network.

With increasing demand for both Genève - La Plaine and Genève - Bellegarde services, the Bem 550 units and the infrastructure were modified in 2001 to meet SNCF standards (including fire protection, signalling, etc.), at a cost of 12 million CHF to allow them to run beyond La Plaine to Bellegarde.

This left a requirement for CFF to hire trains to help run the increased service, resulting in four SNCF class 25500 locomotives with three coach suburban push-pull Rio (Rame Inox Omnibus) sets (two for service, one for reserve, one on maintenance in Lyon) being leased. From December 2009 the Bellegarde service was allocated coupled pairs of class 550 units and the La Plaine service was handed over to CFF class 524 Flirt EMUs. Whilst this class is configured to work under 3kV DC for services into Italy, they could work on reduced power under 1500V DC. However, they had to have a number of modifications, for signalling and replacement of the Italian size pantograph. At this point, the class 550 units were given an R3 Revision in Yverdon.

When the route was re-electrified no further use could be found for the units and they were withdrawn on 15 July 2014 and scrapped in March 2015 in Ecublens. Even the TSOL, which was looking for new units, chose to build new ones rather than buy the 550s as the rebuild costs would be too high. (Note that the TSOL units have had their diesel engines removed and so become Be4/6.)

### Third Generation

Since 25 August 2014 the line is operated at 25kV with the CFF services run by class 522/2 Flirt France EMUs along with limited use of class 562 NPZ sets (which can only run as far as La Plaine). The CEVA line, providing a through route from Genève Cornavin to Annemasse, will open in December 2019 and services on this line and the other 'Léman Express' services, including those to La Plaine, will be operated by a mixed fleet of 23 CFF Flirts plus 17 of



TOP: CFF's Genève – Bellegarde service in June 2009 operated by on-hire SNCF BB 525553 plus Rio set.

ABOVE: CFF NPZ 562005 in the bay platform on a La Plaine service in October 2017 after the conversion of the line to 25kV AC.

SNCF's Alstom built Regiolis LEX, tri-voltage, 4-section EMUs.

To support this, stations on the La Plaine line are being rebuilt from 2017 onwards to have 160m, 55cm high platforms to accommodate trains of two Flirts, amongst other improvements.

### Links

<https://www.notrehistoire.ch/medias/2382>

<https://www.snotpg.ch/site/>

[https://en.wikipedia.org/wiki/CFF-CFF-FFS\\_BDe\\_4/4\\_II](https://en.wikipedia.org/wiki/CFF-CFF-FFS_BDe_4/4_II)

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